

Please amend the present application as follows:

**In the Specification**

The following is a marked-up version of the specification with the language that is underlined (“    ”) being added and the language that contains strikethrough (“”) being deleted:

**For the paragraph beginning at page 1, paragraph [0002]:**

This application is related to copending U.S Utility patent application entitled “Capacitive Resonators and Methods of Fabrication,” ~~Docket No. 62020.1440~~ having serial number 10/632,176, filed on the July 31, 2003, which is entirely incorporated herein by reference.

**For the paragraph beginning at page 2, paragraph [0009]:**

Embodiments of the present invention provide for an electrically-coupled micro-electro-mechanical system (MEMS) filter system ~~and method. In one embodiment, among others, the electrically coupled MEMS filter method can be broadly summarized by the following steps: providing a first MEMS resonator and a second MEMS resonator adjacent to the first MEMS resonator; and electrically coupling the first MEMS resonator and the second MEMS resonator.~~

**For the paragraph beginning at page 3, paragraph [0010]:**

~~The present invention can also be viewed as providing a MEMS filter system.~~ In this regard, one embodiment of such a system, among others, includes a first MEMS resonator comprising a first resonating element, and a second MEMS resonator comprising a second resonating element, the second resonating element closely spaced and mechanically separate from

the first resonating element electrically coupled to the first MEMS resonator, wherein the second MEMS resonator is electrically coupled to the first MEMS resonator; and additional MEMS resonators electrically coupled to the first MEMS resonator, the second MEMS resonator, or the first and second MEMS resonators.

**For the paragraph beginning at page 10, paragraph [0043]:**

With continued reference to FIG. 3A throughout the discussion of FIGS. 3B-3C, FIG. 3B shows an equivalent circuit 308 for the third order electrically-coupled MEMS resonant filter system 200b. The equivalent circuit 308 includes RLC circuits 310, 312, and 314 (labeled  $R_1$ ,  $R_2$ ,  $R_3$ ) corresponding to resonators 302a, 302b, and 302c, respectively. Coupling capacitor elements 304 and 306 (of FIG. 3A) are represented by coupling capacitors ( $C_c$ ) 316 and 318. Coupling capacitor ~~304~~ 316 electrically couples RLC circuit 310 to RLC circuit 312. Coupling capacitor 318 electrically couples RLC circuit 312 to RLC circuit 314. Similar to the description for FIGS. 2B-2D, in the first resonance mode (reflected by response curve 320 shown in the graph 330 of FIG. 3C), the resonators 302a-c (represented by RLC circuits 310-314) resonate in phase, canceling currents flowing through coupling capacitor elements 304 and 306 (represented by capacitors  $C_c$  316 and 318).

**For the paragraph beginning at page 10, paragraph [0045]:**

For the third resonance mode, each resonator (~~310, 312, and 314~~ 302a-302c) is resonating out-of-phase with respect to the resonator adjacent to it, resulting in the response curve 324 as shown in the graph 330 of FIG. 3C, and can be determined algebraically from equation 325 (FIG. 3C).

**For the paragraph beginning at page 11, paragraph [0046]:**

The asymmetry in the frequency responses shown in the graph 330 (FIG. 3C) of the third order filter system 200b (FIG. 3A) is due at least in part to the end resonators 302a and 302c (FIG. 3A) having only one coupling capacitor element (either 304 or 306, FIG. 3A) attached coupled to them but the resonator 302b (FIG. 3A) in the middle is terminated with two coupling capacitor elements 304 and 306 at the two ends. FIG. 4A shows a simulated frequency response curve 400 for an example third order electrically-coupled MEMS filter system, such as the electrically-coupled MEMS third order filter system 200b shown in FIG. 3A. The asymmetry can be compensated for by a slight frequency tuning of the end resonators (*e.g.*, 302a and 302c, FIG. 3A), the result of which is shown by the simulated response curve 402 shown in FIG. 4B. The slight tuning of the end resonators can result in an increase in the insertion loss. Another solution to addressing this asymmetry is to use a closed chain of coupled resonators to have complete symmetry for all the resonators.

**For the paragraph beginning at page 14, paragraph [0053]:**

FIG. 6B shows the electrical equivalent circuit 420 620 for the electrically-coupled MEMS filter system 200c. To convert this mechanical system to an electrical equivalent circuit with series RLC circuits as the resonators, stiffness is converted to capacitance, mass to inductance, and the loss element to resistance ( $K \rightarrow 1/C$ ,  $M \rightarrow L$ , and  $D \rightarrow R$ ). Therefore, current in the electrical equivalent circuit 620 represents displacement of the resonators (*e.g.*, 606a-n) and the derivative of voltage represents force. Since the force applied by the coupling stiffness is determined by the sum of the two resonators' displacements, the coupling element (*e.g.*, series capacitance) is represented by a shunt capacitor (having value  $C_c$ ), at the coupling node in

between the two resonators so that the sum of the currents of the resonators will determine the coupling capacitor's ( $C_c$ ) voltage. Due to similarity of the equivalent electrical circuits for the series and shunt configurations, system performance and formation of different resonance modes for the series configuration is similar to that described and illustrated for the shunt-configured filters. The value of the coupling capacitor capacitance,  $C_c$ , in the equivalent circuit model 620 for the series configured filter is,

$$C_c = \frac{C_{io} K_{mech,eff}}{K_{elec}} \quad (\text{Eq. 5})$$

where  $C_{io}$  (see equation 625 in FIG. 6B) is the resonators' equivalent motional capacitance,  $K_{mech,eff}$  is the resonators' effective stiffness and  $K_{elec}$  is the effective negative stiffness provided by the electrostatic coupling between the adjacent resonators as described. FIG. 6C is a graph that illustrates the measured frequency response of the electrically-coupled MEMS filter system 200c. Filter performance of the series-configured electrically-coupled MEMS filter system 200c is similar to that described and illustrated for the shunt-configured electrically-coupled MEMS filter systems 200a (FIG. 2A) and 200b (FIG. 3A).